

TPJ 2008 “Service Quality Award”—Institute for Healthcare Improvement  
20th Annual National Forum on Quality Improvement in Health Care

# Decreasing Adverse Events through Night Talks: An Interdisciplinary, Hospital-Based Quality Improvement Project

Christine White, MD, MAT  
Javier Gonzalez del Rey, MD, MEd

## Abstract

**Background:** The majority of medical adverse events are secondary to errors in communication. The Joint Commission (known until 2007 as the Joint Commission on the Accreditation of Healthcare Organizations) reports that 70% of sentinel events are the result of communication failures. Review of nonoperative adverse events at Cincinnati Children’s Hospital Medical Center in 2007 found similar statistics: 57% were related to failure to recognize abnormal vital signs and to communicate or address parents’ or nurses’ concerns.

**Objective:** To increase by 80% the number of days between near misses in pediatric neurosurgical patients because of failure to address abnormal vital signs or parents’ or nurses’ concerns during the night shift.

**Materials and Methods:** Baseline data on near misses from the previous night were collected with the use of a written questionnaire completed the next morning by the interns, patient-care facilitators or charge nurse, and attending physicians. Laminated cards with three standardized questions were created to guide a late-evening review of patients’ status by residents, attending physicians, and nurses: the Night Talks discussion. After initiation of Night Talks, data were collected for issues addressed by Night Talks as well as for preventable adverse events.

**Main Outcome Measure:** Number of days between near misses.

**Results:** During a two-month period before the introduction of Night Talks, there was an average of 3.8 days between near misses on neurosurgery patients. After the initiation of Night Talks, days between near misses due to the failure to address abnormal vital signs or parents’ or nurses’ concerns increased to 201 days, a 5360% change.

**Conclusion:** Instituting standardized Night Talks substantially reduced near misses in neurosurgical patients at our institution at night.

## Introduction

### Background

The majority of medical adverse events are secondary to errors in communication. Analysis of 5632 sentinel events reported to the Joint Commission (known until 2007 as the Joint Commission on the Accreditation of Healthcare Organizations) since January 1995 reveal that 70% are the result of communication failures.<sup>1</sup> In response to these overwhelming national data, the Joint Commission’s 2009 national patient safety goals have challenged the medical profession with improving effective communication among caregivers.<sup>2</sup>

We reviewed root cause analyses of nonoperative serious safety events (SSEs) at Cincinnati Children’s Hospital Medical Center (CCHMC) in 2007 and found failure in team communication or team situation awareness (SA) to be a common cause. Four of seven SSEs (57%) involved poor recognition of abnormal vital signs or poor communication of parents’ or nurses’ concerns. Many of these events occurred during the night shift when resources are at their lowest, there are multiple sign-outs of physicians and nurses, and communication among nurses, physicians, and patients’ families is less frequent. Although SSEs are rare and always resulted from a series of errors, we believed that errors in communication and in SA were commonly resulting in lesser harm, or near misses, more frequently. With the release of the new Institute of Medicine<sup>3</sup> regulations about hours for residents and the potential for increased discontinuity

Christine White, MD, MAT, is an Assistant Professor in the Division of General and Community Pediatrics at Cincinnati Children’s Hospital Medical Center. E-mail: christine.white@cchmc.org.

Javier Gonzalez del Rey, MD, MEd, is a Professor in the Division of Pediatric Emergency Medicine at Cincinnati Children’s Hospital Medical Center. E-mail: javier.gonzalez@cchmc.org.

of care and increased transfers of care (handoffs), we recognized the need to improve SA and communication. We believed that a strategy to reduce near misses would ultimately result in avoiding more SSEs.

Despite evidence that adverse events can occur secondary to communication failures, the literature poorly addresses how to prevent these errors. Other than suggestions on improving the handoff process itself with formalized training sessions on sign-out techniques, there is little information on how to integrate elements of SA into the daily operations of an inpatient unit. Situation awareness, as defined by Wright et al,<sup>4</sup> is a person's perception of elements in the environment, comprehension of that information, and the ability to project future events on the basis of this understanding. Because much of patient-care activity occurs in settings with multidisciplinary teams, it is important to consider team SA. According to Cooke et al,<sup>5,6</sup> team SA encompasses two foci: 1) shared knowledge that does not overlap and is complementary and 2) common shared knowledge among team members.

### Intended Improvement

At CCHMC, the nurses discuss concerns with other nurses and the charge nurse, and similar discussions occur among the covering residents. However, there is not a formalized discussion between the physicians and nurses. In addition, neither group has a formal method to incorporate elements of team SA, nor are concerns systematically reviewed with an attending physician.

An improvement team was developed consisting of the pediatric residency program director, pediatric chief residents, interns, and senior residents rotating through the service, the nursing clinical manager of unit A7NS, two night-shift patient-care facilitators (PCFs), and a quality-improvement consultant. A7NS was chosen for this study because that unit houses all the pediatric neurosurgical patients. (Other subspecialty services typically have patients on more than one unit because of census issues, age restrictions, and required level of care.) In addition, the pediatric chief residents serve as pediatric co-attending physicians on the neurosurgical service so that they could not only participate in project implementation but could also monitor project progress.

This project was designed to enhance communication and team SA during the night shift to decrease the number of adverse events, or near misses, in the neurosurgical population on an inpatient unit. We defined a near miss as any event that has the potential to result in patient harm or is perceived by families as

an error in care. We chose near misses as an outcome measure to capture and address issues before they became SSEs. SSEs traditionally are events reported at the time that something happens; we wanted to prevent SSEs from occurring. As mentioned, residents noted the common issues that arose in root cause analyses of SSEs with communication being the main issue. Thus we gathered a group of front-lined clinicians to create a list of common near-miss events. Examples of near misses included laboratory tests not ordered or performed overnight that would have affected patient care, critical laboratory values not addressed, any medications or intravenous fluids ordered incorrectly, or parental concerns not addressed in previous shifts. We elected to use days between near misses as our primary measure.

Our primary goal was to increase by 80% the number of days between near misses in all neurosurgical patients admitted to the neurosurgical unit during a three-month period. At baseline, as measured during one month, the neurosurgical service averaged 3.8 days between near misses. Thus, our goal was to increase the number of days between near misses to 6.8 days. To achieve this goal, we instituted a standardized Night Talk among interdisciplinary and multilevel clinicians.

### Methods

#### Setting

CCHMC is a tertiary-care center in southwestern Ohio with four neurosurgical attending physicians. A7NS is a 34-bed inpatient unit that houses neurology patients, neurosurgical patients, and general pediatrics overflow. The neurosurgical census ranges from 0 to 12 patients per day. The average nightly census is three to five patients. The average yearly neurosurgical census is 600 patients per year. Each pediatric intern rotates through the neurosciences rotation, which includes both neurology and neurosurgical teams and patients. Each team consists of four interns, two senior residents, neurology and neurosurgical attending physicians, and the pediatric chief residents, who serve as neurosurgery co-attending physicians. The pediatric chief residents have clinical responsibilities as general pediatric attendings. They have medical staff privileges and assume the pediatrician ownership of patient care on the neurosurgical patients. Each of the neurosciences interns and senior residents take call (30-hour shifts) every fourth night. A senior resident from another hospital service assumes patient-care responsibilities the two nights of the call rotation when the neurosci-

**Despite evidence that adverse events can occur secondary to communication failures, the literature poorly addresses how to prevent these errors.**

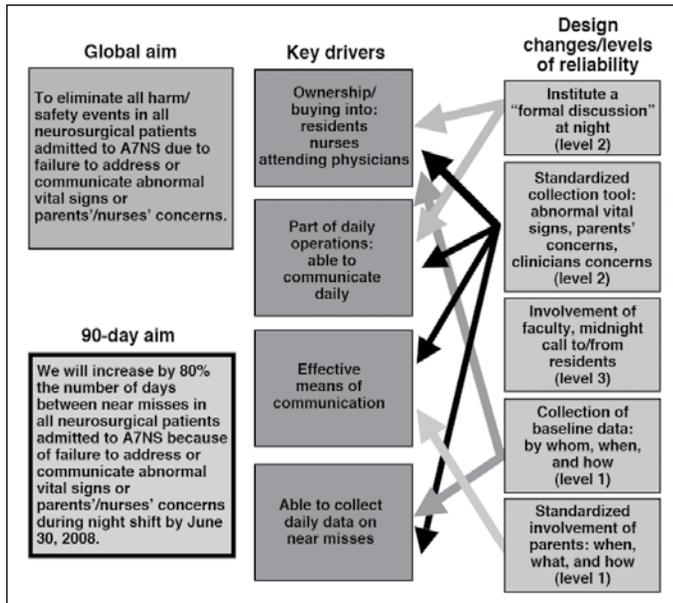


Figure 1. Key-driver diagram.

ences team senior resident is not on call. At night, the pediatric residents are the primary in-house resident physicians responsible for the neuroscience patients, with backup provided by the pediatric chief resident neurosurgery co-attending physicians and ultimately the neurology and neurosurgery attending physicians. The night nurses on A7NS work shifts from 7 PM to 7 AM or 11 PM to 7 AM.

Typically, the patient population of the neurosurgical service consists of children with congenital hydrocephalus who have just had ventriculoperitoneal shunt revisions, children with myelomeningoceles, patients with infections associated with ventriculoperitoneal shunts requiring extraventricular drains, those with Chiari decompressions, those with epileptic seizure focus resections, those who have

1. Do you have any concerns or questions about your neurosurgery patients?  
 2. Do any of your neurosurgery families have any concerns about their child?  
 3. Do any of the patients have any abnormal vital signs that you cannot explain?  
 4. Are there any unclear orders for any of your neurosurgery patients?

**If the answer is yes to questions 1-3, the intern, senior, PCF and bedside nurse must assess the patient together. If yes to question 4, orders must be revised at that time.**

After discussion, the intern must call the neurosurgery chief attending physician on call.

Figure 2. Laminated card used to guide the Night Talks.

PCF = patient-care facilitator

undergone baclofen pump revisions or insertions, those who have had craniosynostosis repairs, those who have had tethered cord repairs, those with brain tumor resections, and those who have experienced nonaccidental traumas.

### Planning the Intervention

The improvement team used the standard methodology at CCHMC, which involves the use of the Model for Improvement.<sup>7</sup> The team developed an aim statement, a run chart of the outcome, and a key-driver diagram (Figure 1) to formalize its hypothesis. Through multiple plan-do-study-act (PDSA) cycles, we tested our intervention, a formal multidisciplinary discussion focused on team SA that we named Night Talks.

By means of a series of tests, it was determined that 1:30 AM was the best time for all parties to meet. Built into the system, though, was some flexibility needed to accommodate the patient census and the condition of patients on the floor. Testing showed the discussion could not occur prior to 11:30 PM because the nurses starting at 11 PM needed time to adequately assess their patients. Furthermore, we wanted to include the third-shift nurses because they are the staff members most removed from the decision making in morning rounds and least informed about the plans for the day. In addition, testing showed that after midnight was also the best time for the residents, who tended to delay decision making until morning rounds when the whole team was available.

Testing also allowed us to formalize the issues discussed to improve team SA. Three questions were developed that were based on the common causes of adverse events at CCHMC. A laminated card was distributed to the nurses and residents that detailed the questions to guide the discussion (Figure 2).

After evaluating several PDSA results, the patient-care facilitator (PCF), or charge nurse, and intern were chosen as the representatives at the meetings. The PCFs had the time and availability to attend the meeting consistently, as they did not have direct patient-care responsibilities. The interns had more in-depth knowledge of the patients, particularly on the nights when there was a senior resident from another hospital service covering the neurosciences service. The senior resident was not chosen, owing to less availability because senior residents are required to cover an additional service other than neurosciences at night. Our testing resulted in a reliable standardized process improving team SA during the high-risk overnight period.

Testing showed that a call to the attending physician

was important to ensure that the process was thorough and decisions were reviewed by a more senior clinician. Night Talks also standardized the involvement of patients' parents, often key providers of subtle changes in patients.

### The Night Talks Process

The Night Talks proceed as follows:

- Bedside nurses ascertain parents' concerns.
- The PCF asks the questions on the laminated card of all the bedside nurses taking care of neurosurgical patients. At the same time, the senior resident and intern perform the same task.
- Each night, around 1:30 AM, the PCF or intern coordinates the schedules of the two parties for Night Talks.
- When both parties are prepared, the PCF and intern meet on the unit to perform the Night Talks and compare the issues that have arisen in their individual reviews.
- After the PCF and intern have completed the Night Talks, an evaluation of the patient is performed if there are any abnormal vital signs reported or any concerns. For these patients, the senior resident, intern, bedside nurse, and PCF are all required to go to the patient's room for an assessment. Once the patient has been assessed, a plan is put in place by the medical team to address the particular concern.
- Finally, after the Night Talks and assessment, the intern calls the attending physician to review the Night Talks discussion.

We chose a time series to study the effectiveness of Night Talks at increasing days between near misses on A7NS. We developed a plan to collect data daily throughout the baseline and testing phase. The measurement plan included the following steps:

1. A written questionnaire was completed each morning by the interns, PCF, and attending physician. This questionnaire (Figure 3) contained various elements of SA and was designed to identify any near misses overnight. We chose multilevel as well as interdisciplinary participation to validate results and decrease the reporting bias inherent to having only a single observer.
2. Visible reminders were posted in the resident conference room and the PCF office to ensure that all parties returned provided data daily. The forms themselves, as well as the collection boxes, were placed in each of these locations. An administrative assistant paged the pediatric chief co-attending physicians on service to distribute the forms.

3. The questionnaires were collected and reviewed by the team leaders each week to determine the number of near misses per week. The information was entered into a Microsoft Office Excel 2003 Version 11 spreadsheet (Redmond, WA), which permitted the development of a chart depicting the outcomes data (days between near misses). Data was entered weekly. The x-axis reflects the timeline of dates when events occurred. The y-axis represents the days in between events. The control limits are automatically calculated by the program and are three standard deviations about the mean.

In addition, the pediatric chief residents completed a journal of events discussed at each Night Talks to track issues.

### Results

Review of the baseline data before implementation of Night Talks revealed that near misses overnight were occurring in neurosurgical patients an average of every 3.8 days (Figures 4 and 5). During the same baseline period, the longest time period without adverse events was 10 days, with a range of 1 to 10 days. Events reported during the baseline period included:

- Unaddressed family and nursing concerns about inadequate pain control
- Nonperformance of a shunt tap to evaluate for infection in a patient who had undergone shunt revision, because the neurosurgeons were not informed that the patient had a fever
- Nonperformance of a postoperative complete blood

Neurosurgery Attending Checklist		
Date: _____		
After rounds, please answer yes or no to the following questions. If you answer yes to any of the questions, please give an explanation in the box below. Please return all sheets to the box in the A7 office.		
Were there any patients transferred to the ICU overnight?	Yes	No
Was a code or Medical Response Team called for any patient overnight?	Yes	No
Was there any delay in initiation of care (treatment, procedure, consultation, or disposition) overnight?	Yes	No
Were there any abnormal vital signs or trends that were not recognized and/or addressed overnight?	Yes	No
Were you unaware of any significant nursing, resident, fellow, and parent concerns overnight?	Yes	No
Were there any medications or intravenous fluids ordered incorrectly overnight?	Yes	No
Were there any critical lab results that were unaddressed overnight?	Yes	No
If yes, please explain:		

Figure 3. Questionnaire used to identify near misses.

count to evaluate for anemia, because blood for it was not drawn

- Lack of treatment for eight seizures that occurred overnight in a patient who had just undergone surgery, because the resident was not informed about the seizures.

During the early test phase, no significant change was noted. After addition of the standardized questions to the process, the number of days between near misses significantly increased—up to 201 (5360%) (Figure 4). The failure at day 201 occurred when the intern forgot to tell the attending physician about a patient transferred in from the intensive care unit who had hypertension. Had the attending physician been aware of the issue, an anti-

hypertension medication would have been administered in the middle of the night instead of the next morning. There was not any adverse outcome for the patient, but the delay in treatment was considered a near miss. In a review of the pediatric chief residents' journal, a sampling of issues discussed included the following: closer monitoring of a patient who had recently had surgery and had low blood pressure and tachycardia; changing a patient's baclofen dose from oral to intravenous while the patient had emesis instead of withholding the dose, to avoid baclofen withdrawal; and obtaining an emergency computed tomography scan of the head for a patient with increasing lethargy. Typically one to two times per week, the discussion between the pediatric chief resident and the intern during Night Talks prompted a call to the neurosurgery fellow or attending to defer to their expertise to adequately address an issue.

**Discussion**

By implementing a standardized night discussion focused on improving team SA, we were able to substantially increase the number of days between near misses in the neurosurgical patients during the overnight period. Key components in our design were standardized questions, formal discussion time, inclusion of nurses and residents, and follow-up discussion with the attending physician. Our testing and study were not designed to demonstrate which of these components are most crucial. We were able to show that a combination of these components into a Night Talks approach significantly decreased the rate of near misses. No SSEs occurred during the study phase, but these events are too rare to know for sure if a decrease in near misses will be associated with a decrease in SSEs. We also believe that there were additional effects on the culture of safety. Night-shift nurses reported feeling more a part of the team because they are now involved in the patients' plans. The residents also appreciate the attending physicians supervising their decisions at a point in the night when they feel most vulnerable. Finally, the attending physicians are more aware of the issues at night so that plans can be initiated earlier and adverse events can be prevented.

Front-line staff ownership of the improvement effort from the beginning was instrumental in the success of the project, making it easy to implement the changes in a practical and efficient way. At the same time, teaching SA to the caregivers in direct contact with the patients provided them with basic mental skills to recognize high-risk situations that have high error potential.<sup>8</sup> Producing an efficient, effective, and streamlined process

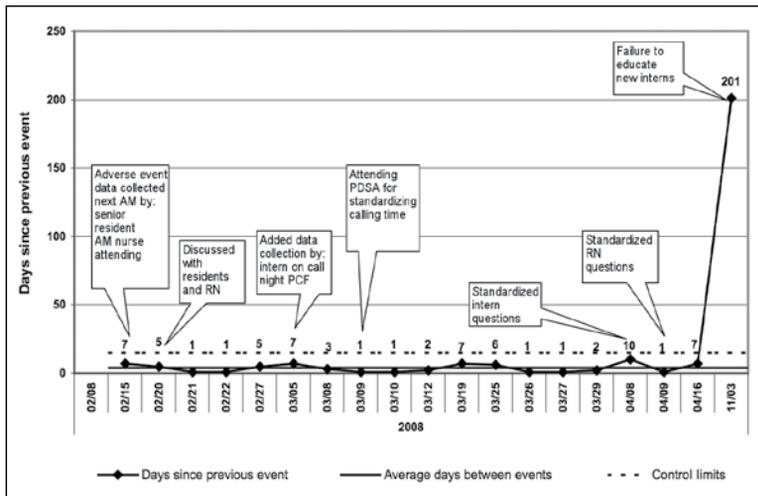


Figure 4. Graph of days between near misses with annotations of changes made to create the final process.

PCF = patient-care facilitator; PDSA = plan, do, study, act; RN = registered nurse.

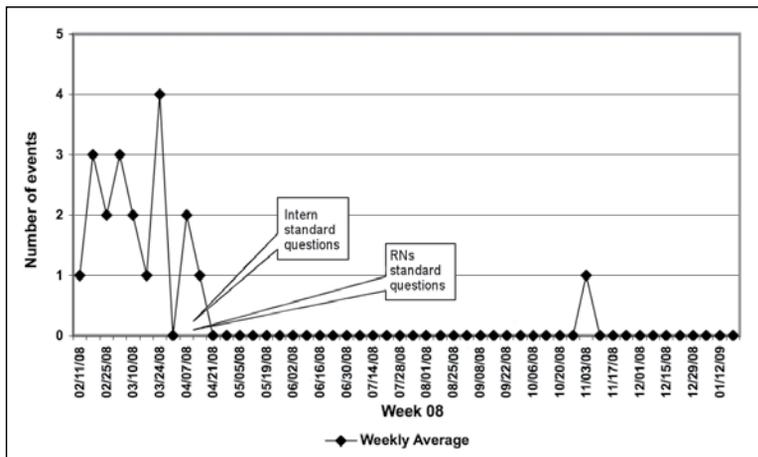


Figure 5. Graph of number of near misses during the baseline period.

RN = registered nurse.

reduced stress and decreased the additional amount of time required of staff. Tests of the actual time involved demonstrated that the whole process added only 15 to 20 minutes more work to the caregivers' schedules. At the same time, the project's success did require time and resources. We had to change the culture as well as achieve buy-in from all parties. We continuously reevaluated and revised the process when it was not working. Specifically creating a reliable system for collection of the baseline data sheet took longer than expected, particularly with insuring collection on the weekend. Visible reminders in the workspaces of the residents and nurses helped. The addition of an administrative assistant to hand the forms to the pediatric chief resident each week improved the return. During the testing phase, before seeing any results, we had to achieve buy-in each month as a new set of residents rotated through the service, which was time consuming. Assuring that we maintained balance between learning, education, and service was a priority. Lastly, convincing the pediatric chief residents that a phone call every night in the middle of the night would improve patient care and patient safety is a continuing challenge, but has improved as the data has demonstrated an impact.

Unintended consequences also emerged from the project. After the institution of Night Talks, morning rounds became more efficient because plans could be developed in rounds. Involving the residents in the process also improved education about quality-improvement strategies and fostered quality-improvement training. In addition, a discussion at night between intern and attending physician offers another opportunity to learn and teach. Finally, Night Talks forced action on the residents, so that decisions were made when issues arose instead of delayed to the morning, holding the residents to a higher degree of accountability to prevent adverse events. The success of the implementation of Night Talks on the neurosurgical unit has prompted other units and services to incorporate the principles of SA and enhanced communication at night into their daily practice.

Improvement was shown by a decrease in the number of near misses in this clinical microsystem, but there are limitations to our design. Participants in the testing were also responsible for documenting the outcome measure. This might have resulted in bias in reporting. In addition, self-reporting of near misses might have been intimidating to participants who did not want to implicate themselves in adverse events. We attempted to decrease these biases by instituting an interdisciplinary evaluation of the previous night's events. The majority of the near misses reported were corroborated by at

least one other discipline, but more work needs to be done in teaching situation awareness to all disciplines, which will increase reliability.

Another limitation was that baseline data were collected for only two months. A longer baseline period would allow the reader to have additional confidence this intervention resulted in improvement. However, the considerable improvement in the number of days between near misses sustained for months after the intervention lessens this concern.

Context will likely be important for other organizations considering similar interventions. In our project, the pediatric chief residents or co-attending physicians are typically on service for only one week at a time. This format may not be generalizable to other services where attending physicians are on service for an entire month, which means a phone call in the middle of the night every night. In addition, for services with patients on more than one nursing unit, the time involved may make the intervention more difficult. Services reporting to more than one attending physician may have more trouble with communication. The role of subspecialty fellows (post-residency trainees) will be important to clarify at our center and other academic institutions.

We plan to test various options as we spread Night Talks to additional services and units. Currently we are testing on the gastroenterology (GI), oncology, neurology, and adolescent units and services. In these units, we are evaluating different styles of communication after residents and nursing staff have reviewed the required information. In the GI unit, the process is testing a conference call between attending, fellow, and residents. In the neurology unit, the process is testing a talk to fellows followed by a discussion with attendings prompted by very specific guidelines for the attending call. In the adolescent unit, they are testing the process of talking directly to the attending. In addition, we will incorporate more elements of SA (eg, Pediatric Early Warning Score [PEWS],<sup>9</sup> high-risk medications) into the process, which will standardize the question of "are there any nursing concerns?" Finally, and perhaps most importantly, we are formalizing the process of assessing family concerns through a Family Engagement process, which includes an algorithm to address and ascertain family concerns in a standardized way.

**... a discussion at night between intern and attending physician offers another opportunity to learn and teach ... improving communication during high-risk times such as the night shift.**

## Conclusion

Instituting a standardized Night Talk between the bedside nurse, PCF, intern, senior resident, and attending physician substantially reduced near-miss events in the neurosurgical patients on one unit. Because of the restriction in work hours, medical practice is evolving into more shift work, which in turn brings more discontinuity of care. By improving communication during high-risk times such as the night shift, as well as by improving team SA, adverse events can be substantially reduced. More effort must be put into improving hand-offs and training caregivers in SA. To meet the demands of the Joint Commission's national patient safety goals, more focus must be placed on an interdisciplinary and multilevel improvement in communication. ❖

## Disclosure Statement

*The author(s) have no conflicts of interest to disclose.*

## Acknowledgments

*Special thanks to Steve Muething, MD, Pat Pilcher, Kelly Boehringer, Kelli Pille, the chief residents, residents at CCHMC, and all of the A7NS nurses for their help throughout this process.*

*Katharine O'Moore-Klopf, ELS, of KOK Edit provided editorial assistance.*

## References

1. Robert Wood Johnson Foundation [Web page on the Internet]. Oak Brook, IL: Joint Commission Resources; 2002-2009 [cited 2009 Oct 8]. Available from: [www.jcrinc.com/Products-and-Services/Conferences-and-Seminars/Robert-Wood-Johnson-Foundation-Communication/](http://www.jcrinc.com/Products-and-Services/Conferences-and-Seminars/Robert-Wood-Johnson-Foundation-Communication/).
2. NPSG #2: Improve the effectiveness of communication among caregivers [monograph on the Internet]. Oak Brook, IL: Joint Commission Resources; 2002-2009 [cited 2009 Oct 8]. Available from: [www.jcrinc.com/NPSG-2-Improve-the-effectiveness-of-communication-among-caregivers/](http://www.jcrinc.com/NPSG-2-Improve-the-effectiveness-of-communication-among-caregivers/).
3. Ulmer C, Wolman D, Johns M, eds. Resident Duty Hours: Enhancing Sleep, Supervision, and Safety. Washington, DC: National Academies Press; 2008.
4. Wright MC, Taekman JM, Endsley MR. Objective measures of situation awareness in a simulated medical environment. *Qual Saf Health Care* 2004 Oct;13 Suppl 1:i65-71.
5. Cooke NJ. Cognitive task analysis for teams, CTA resource on-line seminar 2002 [PowerPoint presentation on the Internet]. Bedford, MA: MITRE Corporation; 1997-2009 [cited 2009 Oct 15]. Available from: [http://mentalmodels.mitre.org/cog\\_eng/reference\\_documents/Cooke\\_Teams.ppt#256,1,Cognitive Task Analysis for Teams](http://mentalmodels.mitre.org/cog_eng/reference_documents/Cooke_Teams.ppt#256,1,Cognitive%20Task%20Analysis%20for%20Teams).
6. Cooke NJ, Salas E, Cannon-Bowers JA, Stout RJ. Measuring team knowledge. *Hum Factors* 2000 Spring;42(1):151-73.
7. Langley, GJ, Nolan KM, Norman CL, Provost LP, Nolan TW. *The improvement guide: a practical approach to enhancing organizational performance*. San Francisco, CA: Jossey-Bass; 1996.
8. Reason J. Beyond the organizational accident: the need for "error wisdom" on the frontline. *Qual Saf Health Care* 2004 Dec;13 Suppl 2:ii28-33.
9. Tucker K, Brewer TL, Baker RB, Demeritt B, Vossmeier MT. Prospective evaluation of a pediatric inpatient early warning scoring system. *J Spec Pediatr Nurs* 2009 Apr;14(2):79-85.

## Be Prepared

There is no such thing as bad weather, just unprepared people.  
 The weather just happens; it is neither bad nor good,  
 cruel nor pleasant; it just is.  
 We interpret it as bad or good because of how it affects us,  
 but in reality, weather is just weather.  
 All we can really do is be prepared.

— Larry Wilson and Hersch Wilson,  
*Play to Win!: Choosing Growth over Fear in Work and Life*